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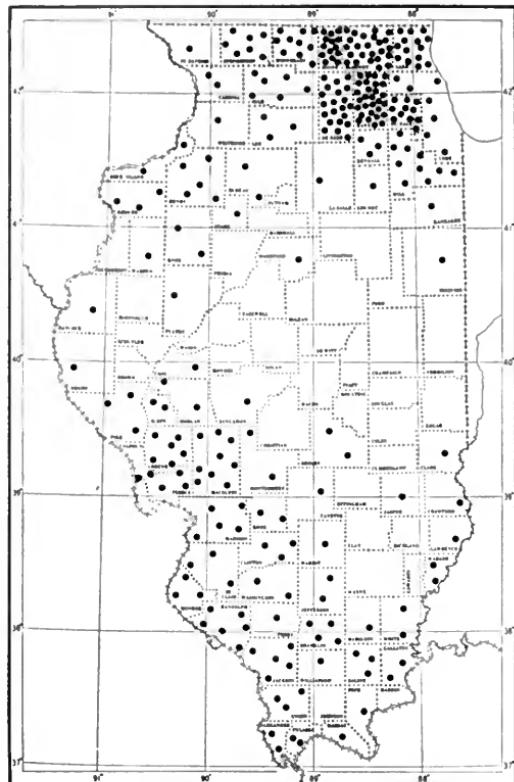


# BARLEY

By G. H. Duncan and  
W. L. Burdick

Bulletin 42

UNIVERSITY OF ILLINOIS  
AGRICULTURAL EXPERIMENT STATION



**Acreage of barley in Illinois.** Each dot represents in round numbers 500 acres planted to barley as an average for 1939 and 1940. Spring-barley varieties are grown in the northern part of the state and winter varieties in the southern part.

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# Spring Barley in Illinois

By G. H. DUNGAN and W. L. BURLISON<sup>1</sup>

PRODUCTION OF SPRING BARLEY is confined to the northern half of Illinois, which lies within the southern limits of the spring-barley area of the United States. Most of the Illinois crop, however, is grown in the northernmost third of the state. In the southern half of Illinois the acreage of barley has increased in recent years but winter varieties are used almost exclusively. The spring-barley area and the winter-barley area are separated by a wedge-shaped section in the east-central portion of the state where practically no barley is produced.

Acreages and yields of barley in Illinois fluctuate widely from year to year. During the fifteen years 1927-1941 the area planted to barley, both spring and winter varieties, ranged from a low of 80,000 acres (1935) to a high of 624,000 acres (1928); the average for the period was 249,500 acres. The acre-yield during these years ranged from an average of 11 bushels in 1934 to 36.5 bushels in 1940.<sup>2</sup>

TABLE 1.—SMALL GRAINS: AVERAGE ACRE-YIELDS IN NORTHERN, CENTRAL, AND SOUTHERN ILLINOIS AND THEIR YIELD RANKING FOR THE STATE  
(Tests in northern Illinois at DeKalb, 1938-1940; central Illinois, Urbana, 1938-1941; and southern Illinois, Alhambra, 1939-1941)\*

Grain and Rank	Northern	Central	Southern	Northern	Central	Southern	Average
	b <u>u.</u>	b <u>u.</u>	b <u>u.</u>	lb.	lb.	lb.	lb.
1 Winter wheat.....	35.7	37.5	27.3	2 142	2 250	1 638	2 010
2 Spring oats.....	71.6	60.4	47.4	2 291	1 933	1 517	1 914
3 Spring barley.....	40.6	38.3	18.9	1 949	1 838	907	1 565
4 Winter barley.....	23.0	30.1	35.8	1 104	1 445	1 718	1 422
5 Spring wheat.....	18.8	18.8	8.5	1 128	1 128	510	933
6 Winter oats.....	0	21.2	51.5	0	678	1 648	775

\*These years were selected because they were the only years when all six small grains were grown on the same field.

Of the six small grains produced in Illinois, spring barley ranks third in number of pounds of grain produced, according to the average of tests on the University's experimental fields (Table 1). Winter wheat ranks first and spring oats second.

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<sup>2</sup>Statistics on barley acreage and yields were furnished by the Illinois Co-operative Crop Reporting Service, Illinois Department of Agriculture cooperating with the U. S. Department of Agriculture.

The two highest ranking crops, winter wheat and spring oats, show the least yield fluctuation from one part of the state to another. Spring barley, on the other hand, yields well in northern Illinois, does fairly well in the central portion, but gives a very poor yield in the southern part of the state. In these tests spring barley averaged 76 percent higher yield than winter barley in northern Illinois, but in southern Illinois yielded only 53 percent as much as winter barley. Barley obviously is very sensitive to climatic conditions.

## CHOOSING A VARIETY

Spring barleys vary widely in yielding ability, disease resistance, kind of awn and straw, and quality of grain (Table 2). To determine which varieties possess the greatest number of desirable characters and are best adapted to the area, twelve varieties have been grown during the past fifteen years on experiment fields in northern and central Illinois. Altho spring barley is not considered adapted to southern Illinois, two spring varieties have been tested on the Alhambra field during the past three years.

In these tests the varieties have been rated according to the number of bushels their yield exceeds or is exceeded by the average yield of all varieties in the test during the same years. In 1940 and 1941 the tests in northern and central Illinois were conducted so that the yield data could be analyzed statistically to determine significant differences.

### Northern Illinois

The results obtained on the northern Illinois fields, DeKalb (1927-1940) and Mt. Morris (1941), are presented in Table 3.

Altho Trebi is the highest yielding variety, it has a weak, short straw and a rough awn, and the grain is entirely unsuited for malting. Even a slight mixture of Trebi renders any barley unfit for malting.

Regal ranks second in yield but it was grown for one year only. It has a smooth awn but its grain has a bluish color, making it inferior for malting.

Wisconsin Barbless ranks third with a yield of 3.7 bushels above the average for all varieties grown the same years. It has a barbless awn and a white comparatively mellow kernel acceptable for malting. Because of the favorable yield of Wisconsin Barbless and the general good quality of its grain, it is recommended over Trebi and Regal.

Even if Black Barbless had a higher yield, it would not be a good variety to grow because of its black kernels.

Silver King, which ranks fifth, is rough awned and yields only slightly above the average. It is a Manchuria type and is suitable for malting.



Trebi

Oder-  
bruckerWisconsin  
Barbless

Spartan

The plump rugged grain of Trebi is not suited for malting because of its steely texture. The kernels of Oderbrucker and Wisconsin Barbless, tho comparatively small, possess a mellowness which makes them acceptable for malting when they are blight-free. The broad plump kernels of Spartan are well suited for pearling. The awns of Spartan break easily, as will be noted; in fact, many drop off in the field before the crop is harvested.

TABLE 2.—CHARACTERISTICS OF SPRING BARLEY: 12 VARIETIES TESTED IN ILLINOIS

Variety	Station originating variety	Parent variety	Yield	Time of maturity	Grain quality for malting	Lodging resistance	Use <sup>a</sup>	Size of plant	Type of head	Type of awn
Black Barbless	Michigan	Lion (Manchuria X Lion)	High	Early Medium	Unsuited Fair	Medium Good	Feeding	Short Tall	6-rowed	Barbless
Glabron	Minnesota and U.S.D.A.	Glabron	Medium	Medium Medium	Good Good	Medium Medium	Malting Malting	Medium Medium	6-rowed	Barbless
Ioglos	Iowa	Manchuria (Nepal X Manchuria)	Low	Medium Medium	Unsuited	Medium Medium	Feeding	Medium	6-rowed	Barbed
Manchuria (N. Dak. 2121)	North Dakota	Oderbrucker (Manchuria X Lion)	Low	Medium Medium	Excellent Fair	Medium Medium	Malting Feeding	Tall Medium	6-rowed	Barbed
New Era Hull-less	South Dakota	Silver King	High	Medium Early	Unsuited Good	Medium Good	Malting Peafing	Medium Short	6-rowed	Barbless
Oderbrucker (Wis. Pedigree 5)	Wisconsin	Spartan	Medium	High	Unsuited Good	Poor	Feeding	Short	6-rowed	Barbed
Regal	Minnesota and Saskatchewan	Trebi	High	High	Unsuited	Medium	Malting	Medium	6-rowed	Barbless
Silver King	Wisconsin	Velvet	High	High	Unsuited	Medium	Malting	Medium	6-rowed	Barbless
Spartan	Michigan	Wisconsin Barbless (Wis. Pedigree 38)	Importation (Manchuria X Lion)	Medium	Good	Medium	Malting	Tall	6-rowed	Barbless
Trebi	Minnesota, Idaho, and U.S.D.A.	Wisconsin Barbless (Wis. Pedigree 5)	High	Late	Good	Medium	Malting	Tall	6-rowed	Barbless
Velvet	Minnesota	(Wis. Pedigree 5 X Lion)								

\*Barleys that have the quality requirements for malting and pearlting are also of course suitable for feeding.

TABLE 3.—NORTHERN ILLINOIS: YIELDS OF VARIETIES OF SPRING BARLEY AT DEKALB AND MT. MORRIS, 1927-1941<sup>a</sup>  
(Bushels per acre; date of seeding indicated under year)

Rank	Variety	Bushels												1941 Apr. 22			
		above (+) or below (-) the average yield	Aver- age yield	1927 Mar. 18	1928 Apr. 20	1929 Apr. 8	1930 Apr. 9	1931 Apr. 9	1932 Apr. 12	1933 Apr. 13	1934 Apr. 10 <sup>c</sup>	1935 May 11 <sup>d</sup>	1936 Apr. 16	1937 May 13	1938 Apr. 7	1939 Apr. 7	1940 Apr. 7
1	Trebi	+4.3	37.6	....	....	....	....	44.3	53.4	31.6	2.0	36.5	32.1	40.4	42.5	59.9	33.5
2	Regal	+3.9	58.0	....	....	....	....	....	....	....	....	....	....	....	....	58.0	....
3	Wisconsin Barless (Wis.)	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
4	Pedigree 381	+3.7	38.6	45.5	44.9	31.6	47.8	55.7	52.8	58.5	31.7	.7	35.5	23.4	34.8	35.2	55.2
5	Black Barless	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	41.6
6	Silver King	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
7	Spartan	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
8	Glabron	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
9	Logios	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
10	Velvet	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
11	Oberbrucker (Wis. Pedigree 5)	-2.6	33.5	33.9	47.8	50.5	47.5	42.8	45.4	29.9	.6	30.2	17.0	31.3	34.1	56.7	32.7
12	New Era Hull-less <sup>b</sup>	-2.7	33.8	26.9	47.3	41.9	48.2	36.5	48.8	29.4	.5	30.8	16.3	30.5	36.3	48.3	34.3
12	Manchuria (N. Dak. 2121)	-3.0	28.0	....	....	....	....	....	....	....	....	....	....	....	....	....	31.9
Average		....	35.7	44.0	48.2	51.0	45.1	48.6	28.8	1.7	32.3	21.0	31.8	35.9	54.1	29.5	
																33.9	
																5.2	

<sup>a</sup>Barley was not planted in 1935 because of the prospect of severe damage from chinch bugs. <sup>b</sup>Grown the same years as the variety indicated. <sup>c</sup>Low yields in 1934 were probably caused by abnormally low rainfall during April and May. <sup>d</sup>Continued rainy weather was responsible for late seeding in 1937. <sup>e</sup>Yields of New Era Hull-less were calculated at 42.24 pounds per bushel to compensate for 12 percent of hull carried by other varieties.

Difference necessary for significance.....

..... 6.4

..... 5.2

TABLE 4.—CENTRAL ILLINOIS: YIELDS OF VARIETIES OF SPRING BARLEY AT URBANA, 1927-1941  
(Bushels per acre; date of seeding indicated under year)

<sup>a</sup>Grown the same years as the variety indicated. <sup>b</sup>Low yields in 1934 were probably caused by abnormally low rainfall during April and May. <sup>c</sup>Yields of New Hull-less were calculated at 42.24 pounds per bushel to compensate for 12 percent of hull carried by other varieties.

In the last two years the tests were conducted so that the yields could be analyzed for significant differences. In 1940 Trebi, Regal, Wisconsin Barbless, and Ioglos yielded significantly more than the other varieties; in 1941 only Wisconsin Barbless produced a yield significantly higher than the others.

### Central Illinois

Trebi also leads all other varieties in yield on the test field for central Illinois at Urbana (Table 4).

Second place is held by Spartan, a two-rowed smooth-awned variety that matures early. Altho two-rowed barleys are suitable for malting, they are not used by the trade in this country. Spartan, however, is a very desirable variety for pearlting.

Wisconsin Barbless is third in yielding ability, but for malting it is recommended above all other varieties for central Illinois because it combines desirable yield and quality factors.

Even tho Black Barbless equals Wisconsin Barbless in yield in central Illinois, it is ruled out because of its black kernels.

Regal yields fairly well at Urbana but is low in quality. Ioglos, Silver King, Velvet, Oderbrucker, and Manchuria (North Dakota 2121) are all suitable for malting but yield low.

Glabron has a stiff straw, but it yields below the average and its kernels are rated low by the maltsters. New Era Hull-less has a rough awn and is a feed barley only.

During the two years that the yield data were analyzed statistically at Urbana, the varieties yielding significantly higher than the others were Wisconsin Barbless, Trebi, and Regal in 1940 and Wisconsin Barbless and Ioglos in 1941.

### Southern Illinois

Only two varieties of spring barley, Spartan and Wisconsin Barbless, have been grown on the Alhambra field. Spartan, because of its earliness, produced much better yields than Wisconsin Barbless (Table 5). Since in southern Illinois barley is grown almost exclusively for feed, Spartan is the better variety for this area.

### Wisconsin Barbless Is Best Variety for Illinois

Of all the spring-barley varieties tested, Wisconsin Barbless (Wisconsin Pedigree 38) is the most desirable from the standpoint of both yield and quality. It has a smooth awn and a white kernel. Altho its malting qualities are not so good as those of Oderbrucker, a variety which unfortunately yields low in Illinois, it is considered to be a very good malting barley.

TABLE 5.—SOUTHERN ILLINOIS: YIELDS OF VARIETIES OF SPRING BARLEY AT ALHAMBRA, 1939-1941  
(Bushels per acre; date of seeding indicated under year)

Rank	Variety	Bushels above (+) or below (-) the average of all varieties*	Average yield	1939 Mar. 22	1940 Apr. 1	1941 Mar. 25 <sup>b</sup>
1	Spartan.....	+2.7	25.4	11.4	31.2	19.6
2	Wisconsin Barbless (Wis. Pedigree 38) ..	-2.7	10.1	11.4	....	8.7
	Average.....		11.4		31.2	14.2

\*Grown the same years as the variety indicated. <sup>b</sup>Yielding ability of these two varieties can be compared for 1941 only, since only one of them was planted in each of the other two years.

Wisconsin Barbless, ranking near the top in yielding ability, takes advantage of a long growing period to fill its grain. It is later maturing than the other varieties but it apparently possesses resistance to injury from the early summer heat.

Besides its ability to stand the heat, Wisconsin Barbless also shows resistance to stripe disease. Growers who are not equipped to treat their seed with New Improved Ceresan but plant this variety will not suffer heavy losses during a season when this disease is prevalent.

In threshing there is danger that part of the glume will be torn from the back of the kernel. This occurs because the awn is not so brittle as that of most varieties and does not easily break at the tip of the kernel. The tearing of the glumes can be avoided if proper adjustments are made in the threshing machine or combine.

## HAZARDS TO SPRING BARLEY

The most serious hazards to spring barley are: hot, dry weather during the time the grain is filling, epidemics of scab disease, and damage by chinch bugs.

Hot weather injury to spring barley can generally be avoided if seeding is done early. The plants will make a deep root growth and stool abundantly during the cool, short days and the grain will ripen early. Even tho hot weather comes before the crop is entirely mature, it will cause little reduction in the yield and quality of the grain if the process of filling is well advanced and the plants are deeply rooted.

The scab disease hazard can be reduced by sowing barley on soybean stubble or on plowed cornstalk land. The disease is caused by the fungus, *Gibberella saubinetii*, which attacks corn as well as small grains. If the cornstalks are left on top of the ground and the land is disked instead of being plowed, the spores of this fungus can be

carried from the cornstalks to the heads of the barley, especially if the weather is muggy during the time the grain is filling. When cornstalks are plowed under cleanly the source of infection is removed.

Barley growers know from experience that it is important to prevent scab disease. A scab-infected crop cannot be satisfactorily fed to horses or hogs and it is not acceptable for malting.

Since the chinch bug hazard is seldom serious in northern Illinois, barley may be grown in this area with comparative safety. It should be borne in mind, however, that barley is one of the chinch bug's most favored food plants and, if chinch bugs are abundant, they will cause serious trouble. The adjoining cornfields will be damaged after the barley has been killed or harvested.

## SOWING AND HARVESTING

Spring barley may take the place of oats or some other spring crop in the rotation. It also fits in nicely after fall-seeded small grain which has been winterkilled. When seeded lightly spring barley is one of the best companion crops for small-seeded legumes and grasses because the plants give comparatively little shade during the grain-ripening period. They have rather wide leaf blades but the leaves die early.

For the best results use clean seed treated with New Improved Ceresan or some other disinfectant effective in controlling seedling blight. The seed should be sowed preferably with a drill at the rate of about 8 pecks an acre. Early seeding is so important, however, that if drilling causes an appreciable delay, it is better to seed broadcast. If the seed is broadcast, about 10 pecks an acre are needed.

When the crop is mature the plants are subject to lodging because the straw is weak. Even when barley lodges badly it can ordinarily be harvested with a combine. Whether the crop is harvested with a combine or a binder it should be threshed before the quality of the grain is impaired by weather damage.

## SOME QUALITY REQUIREMENTS FOR MALTING

Barley is used in two ways—for feed and for industrial purposes, mainly for malt. Quality requirements are in most respects the same, but malting barley must meet the following standards not required of feed barley:

*Germination* should be high since nonviable kernels will yield no malt.

*Uniform ripeness* is important. Therefore green patches in the field should not be harvested with the rest of the crop.

*Soundness* is much more important than test weight per bushel. An

appreciable amount of damage, whether from disease, weathering, or mechanical injury, will make barley unfit for malting. Close threshing is especially harmful. If the awns are broken off too close, the kernels will be skinned. To prevent this type of injury the grain should be examined frequently as it is being threshed and adjustments made in the combine or separator.

*Mellowness* is very desirable in malting barley. It is recognized by a chalky appearance of the cut kernel, whereas flinty or steely barleys appear hard and glassy when cut. Mellowness usually develops when the season is cool and ripening is not hastened. Barley grown in Illinois usually ranks high in mellowness, but some varieties are inherently better in this respect than others.

The *kind of variety and its purity* also determine suitability for malting. Only a few varieties, such as Oderbrucker, Wisconsin Barbless, Velvet, and Manchuria, are acceptable to the maltster, and these varieties must be free from even a slight mixture with other types.

**SPRING BARLEY** is adapted to the northern half of Illinois, which lies within the spring-barley area of the United States.

Wisconsin Barbless (Wisconsin Pedigree 38) is the best all-round variety for Illinois. It is smooth-awned, high-yielding, and suitable for malting. It also possesses resistance to stripe disease.

In the southern part of the state, where spring barley is not well suited, the best variety is Spartan. It is a smooth-awned, two-rowed variety suitable for pearlting and feeding. It matures early and tillers abundantly.

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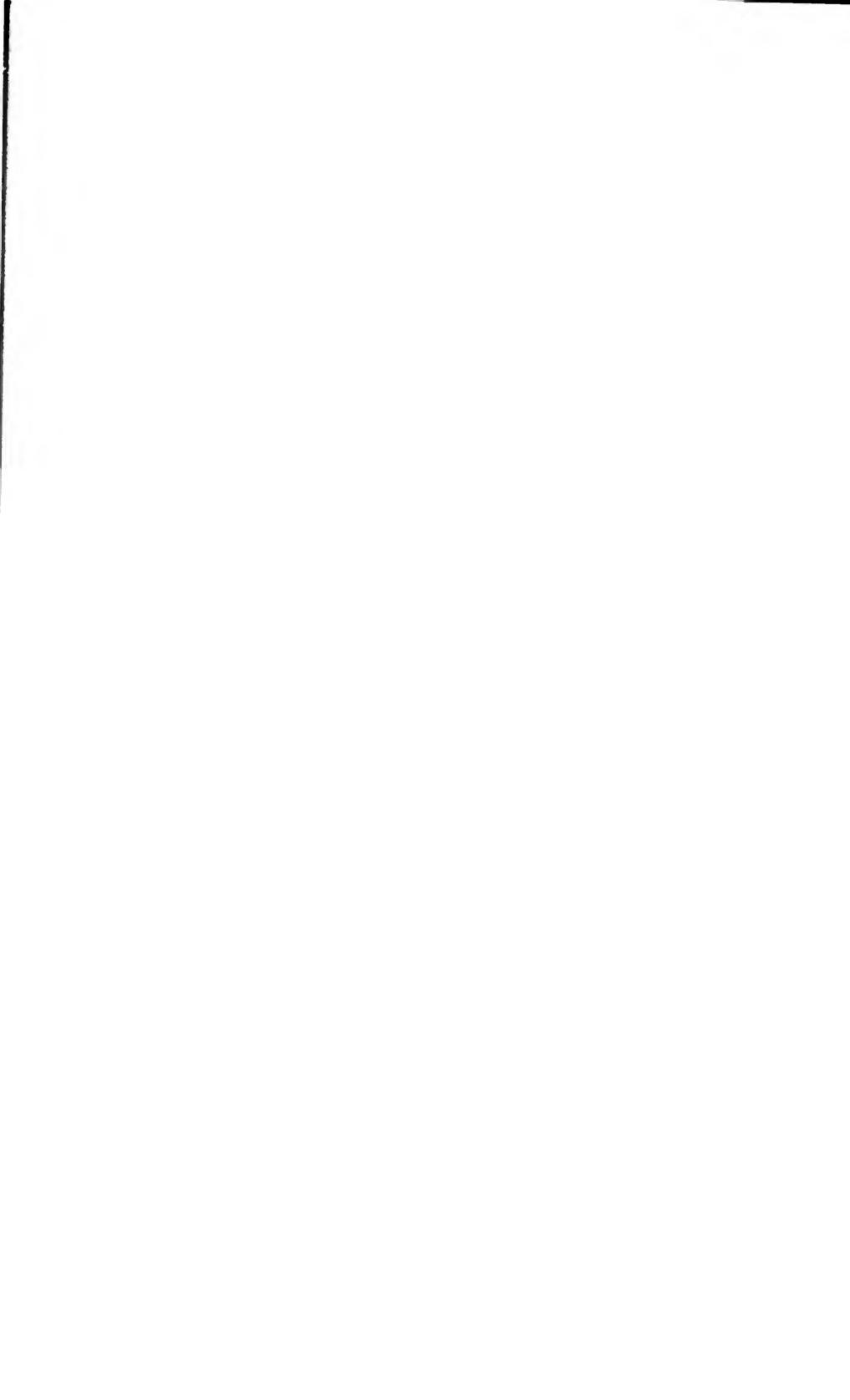
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